

CATALOG DOCUMENTATION
EMAP-ESTUARIES PROGRAM LEVEL DATABASE
1993 DELAWARE AND MARYLAND COASTAL BAYS
SURFACE WATER QUALITY DATA FROM RANDOM AND ITE SITES

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1. DATA SET IDENTIFICATION

1.1 Title of Catalog document

Coastal Bays Database
1993 Delaware and Maryland Bays
Surface Water Quality Data from Random and ITE Sites

1.2 Author of the Catalog entry

Melissa Hughes, OAO Corp.

1.3 Catalog revision date

18 December 1996

1.4 Data set name

WQ_RAN, WQ_ITE

1.5 Task Group

Mid-Atlantic Integration and Assessment (MAIA)

1.6 Data set identification code

201

1.7 Version

001

1.8 Requested Acknowledgment

If you plan to publish these data in any way, EPA requires a standard statement for work it has supported:

"Although the data described in this article have been funded wholly or in part by the U. S. Environmental Protection Agency through its EMAP-Estuaries Program, it has not been subjected to Agency review, and therefore does not necessarily reflect the views of the Agency and no official endorsement should be inferred."

2. INVESTIGATOR INFORMATION

2.1 Principal Investigator

Dr. Frederick W. Kutz
U.S. Environmental Protection Agency - Region III

2.2. Investigation Participant-Sample Collection

Janis C. Chaillou
Versar, Inc.

3. DATA SET ABSTRACT

3.1 Abstract of the Data Set

The Surface Water Quality data set presents the results of analyses conducted on a surface water sample collected at each Random and ITE site. The measurements aid in the characterization of the nutrient concentrations, water clarity and productivity across the Delaware and Maryland Coastal Bays. Nitrogen, phosphorus and carbon species, total suspended solids (TSS), turbidity and chlorophyll a were measured. The presence of trash and the bottom dissolved oxygen concentration are also reported. Since ITE sites were visited more than once, data are reported for each visit.

3.2 Keywords for the Data Set

nitrogen species, phosphorus species, carbon species, total suspended solids (TSS), turbidity, chlorophyll a

4. OBJECTIVES AND INTRODUCTION

4.1 Program Objective

The objective of the Coastal Bays Joint Assessment was to assess the ecological condition of the Delaware and Maryland coastal bays, compare the current ecological condition of the bays with their historical condition and to evaluate indicators and sampling design elements that can be used to direct future monitoring activities in the system.

4.2 Data Set Objective

The objective of the Surface Water Quality data set is to present the results of nutrient, productivity and clarity analyses conducted on a surface water sample collected at each Random and ITE site. The presence of trash at each station and the bottom dissolved oxygen is also reported.

4.3 Data Set Background Discussion

Healthy aquatic ecosystems require clear water, acceptable concentrations of dissolved oxygen, limited concentrations of phytoplankton and appropriate concentrations of nutrients. Clear water is a critical requirement for submerged aquatic vegetation (SAV), which provides habitat for many other aquatic organisms. Algal blooms or suspended sediments can reduce water clarity and the amount of sunlight reaching SAV. Thus, the plants fail to thrive and critical habitat for crabs, fish and other aquatic organisms is lost. Nutrient enrichment causes excessive algal growth in the water column and on the surfaces of plants. As bacteria metabolize senescent excess algae, they deplete dissolved oxygen in the water column and sediments causing hypoxia and, in extreme cases, anoxia.

4.4 Summary of Data Set Parameters

Surface water quality measurements are reported for one sample collected at a station. These included: nitrogen species, phosphorus species, carbon species, total suspended solids (TSS), turbidity, chlorophyll a. Bottom dissolved oxygen is also reported.

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition

5.1.1 Sampling Objective

To collect a surface water sample at each site for various nutrient, clarity and productivity measurements and to record observations on presence/absence of trash.

5.1.2 Sample Collection Methods Summary

A 250-ml sample bottle was deployed 0.5 m below the surface, rinsed three times with ambient water, filled, capped and stored at 4 degrees C for TSS analysis. The procedure was repeated with a 125-ml bottle for the turbidity sample and a 1-gallon bottle for the nutrients sample.

5.1.3 Sampling Start Date

12 July 1993

5.1.4 Sampling End Date

30 September 1993

5.1.5 Platform

Sampling was conducted from 7 m (21 ft) Privateer equipped with an electric winch with a 12-foot boom.

5.1.6 Sampling Gear

250-ml, 125-ml and 1 gallon bottles

5.1.7 Manufacturer of Instrument

NA

5.1.8 Key Variables

This data set contains bottom values measured at the time of sampling.

5.1.9 Sampling Method Calibration

NA

5.1.10 Sample Collection Quality Control

NA

5.1.11 Sample Collection Method Reference

U.S. EPA. 1996. Assessment of the Ecological Condition of the Delaware and Maryland Coastal Bays. U.S. Environmental Protection Agency. Prepared by Versar, Inc., Columbia, MD.

5.1.12 Sample Collection Method Deviations

NA

5.2 Data Preparation and Sample Processing

5.2.1 Sample Processing Objective

Filter an adequate amount of water for sample analyses.

5.2.2 Sample Processing Methods Summary

Field Summary:

Three filtrations were performed for each nutrient parameter using measured aliquots from the same one-gallon sample. The volume of filtered sample varied according to the relative turbidity at a site; high turbidity caused low filtering volumes. A 47-mm diameter GF/F filter was used for total particulate phosphorus analyses; a 25-mm GF/F filter was used for chlorophyll a analysis; and an ashed, 25-mm GF/F filter was used for particulate carbon and nitrogen analysis. Each filter was removed from the vacuum filtration apparatus using forceps, wrapped in aluminum foil, placed in a small zip-lock bag and frozen on dry ice. The filtrates from all three samples for each parameter were combined. The following aliquots were distributed into scintillation vials and frozen: two samples of 20 ml each for analysis of total dissolved nitrogen and phosphorus and two samples of 15 ml each for analysis of dissolved inorganic nitrogen and phosphorus (NO₂, NO₃, NH₄ and PO₄).

Laboratory Summary:

Chemical analyses of water samples followed standard procedures used by the Chesapeake Bay Program:

Chlorophyll a Phaeophytin	Spectrophotometric; Trichromatic
Nitrate and Nitrite	Colorimetric; cadmium reduction
Ammonium	Colorimetric; automated phenate
Total Dissolved Nitrogen	Colorimetric; persulfate oxidation
Orthophosphate	Colorimetric; suromated ascorbic acid
Total Dissolved Phosphorous	Colorimetric; persulfate digestion and automated ascorbic acid
Total Particulate Nitrogen	Oxidative combustion
Total Particulate Phosphorous	Colorimetric; persulfate digestion
Total Particulate Carbon	Oxidative Combustion
Dissolved Organic Carbon	Persulfate Digestion

Total Suspended Solids
Turbidity

Gravimetric
Nephelometer

The presence of floating debris within 50 m of the boat was noted. Debris was categorized as paper, plastic, cans, bottles, medical waste or other.

5.2.3 Sample Processing Method Calibration

The nephelometer used to process the turbidity samples will be calibrated using a standard solution of formaldehyde at the start of each series of analyses and after each group of 10 successive samples. Duplicate analyses will be conducted on at least 10% of the samples.

5.2.4 Sample Processing Quality Control

NA

5.2.5 Sample Processing Method Reference

American Public Health Association. 1981. Standard Methods for the Examination of Water and Wastewater. 15th ed.

Aspilla, I.H., Agemian and A.S.Y. Chau. 1976. A semi-automated method for the determination of inorganic, organic and total phosphate in sediments. *Analyst* 101:187-197.

D'Elia, C.F., P.A. Steudler, and N. Corwing. 1977. Determination of total nitrogen in aqueous samples using persulfate digestion. *Limnol. Oceanogr.* 22:760-764.

Leeman Labs, Inc. 1988. The automated and advanced Model 240X-A Elemental Analyzer.

EPA Method 350.1

EPA Method 365.1

6. DATA MANIPULATIONS

6.1 Name of New or Modified Values

NA

6.2 Data Manipulation Description

NA

7. DATA DOCUMENTATION

7.1 Description of Parameters

Parameter # SAS Name	Data Type	Len	Format	Parameter Label
1 SITE	Num	8	3.	Site Number
2 EVNTDATE	Num	8	MMDDYY8.	Date when Sample Collected
3 EVNTNUM	Num	8	5.	Event Number
4 SECCHI	Num	8	6.2	Secchi Depth (m)
5 TURBID	Num	8	6.1	Turbidity (NTU)
6 B_DO	Num	8	6.2	Bottom Dissolved Oxygen (ppm)
7 SECCHIAD	Num	8	2.	On bottom, use anchor depth (1=Y,0=N)
8 TSS	Num	8	5.1	Total Suspended Solids (mg/l)
9 NH4	Num	8	6.2	Ammonium NH4 (uMol)
10 NO2_NO3	Num	8	6.2	NO2+NO3 (uMol)
11 PO4	Num	8	6.2	Orthophosphate PO4 (uMol)
12 TDN	Num	8	5.1	Total Dissolved Nitrogen (uMol)
13 TDP	Num	8	6.2	Total Dissolved Phosphorus (uMol)
14 CHL_A	Num	8	6.2	Chlorophyll a (ug/l)
15 PHAEO	Num	8	6.2	Phaeophytin (ug/l)
16 PARTPHOS	Num	8	6.1	Total Particulate Phosphorus (ug/l)
17 PARTCARB	Num	8	7.1	Total Particulate Carbon (ug/l)
18 PARTNITR	Num	8	9.4	Total Particulate Nitrogen (ug/l)
19 TRASH	Char	1	1.	Trash present (Y=yes, N=no)

7.1.6 Precision to which values are reported

The number of decimal places for each value reflects the precision of the analysis.

7.1.7 Minimum Value in Data Set by Parameter

SECCHI	0.20
TURBID	1.2
B_DO	0.20
SECCHIAD	0
TSS	2.8
NH4	0
NO2_NO3	0
PO4	0.04
TDN	8.1
TDP	0.47
CHL_A	0.13
PHAEO	-1.20
PARTPHOS	7.4
PARTCARB	377.8
PARTNITR	65.6500

7.1.7 Maximum Value in Data Set by Parameter

SECCHI	2.67
TURBID	60.0
B_DO	19.76
SECCHIAD	1
TSS	157.4
NH4	62.40
NO2_NO3	85.90
PO4	13.20
TDN	102.0
TDP	15.80
CHL_A	371.25
PHAEO	57.56
PARTPHOS	746.7
PARTCARB	30373.3
PARTNITR	4590.6700

7.2 Data Record Example

7.2.1 Column Names for Example Records

SITE EVNTDATE EVNTNUM SECCHI TURBID B_DO SECCHIAD TSS NH4 NO2_NO3
PO4 TDN TDP CHL_A PHAEO PARTPHOS PARTCARB PARTNITR TRASH

7.2.2 Example Data Records

SITE	EVNTDATE	EVNTNUM	SECCHI	TURBID	B_DO	SECCHIAD	TSS	NH4	NO2_NO3
101	08/10/93	1091	0.55	15.1	6.29	0	38.8	5.46	46.20
102	08/10/93	1092	0.42	17.4	8.77	0	27.5	4.51	85.90
105	07/15/93	2016	0.30	32.3	4.50	0	136.4	17.70	7.83
106	08/17/93	1117	0.79	12.4	5.43	0	13.4	1.36	0.16
107	08/04/93	1080	0.77	12.5	6.02	0	14.8	7.74	2.41

PO4	TDN	TDP	CHL_A	PHAEO	PARTPHOS	PARTCARB	PARTNITR	TRASH
0.15	68.7	0.75	15.34	44.87	109.7	4352.6	879.0000	N
0.17	89.9	0.58	37.39	21.49	108.0	4808.4	833.0000	N
1.13	45.7	0.90	41.54	20.26	144.0	5448.0	969.8000	N
0.59	28.1	1.22	50.92	18.40	87.6	3423.7	653.6000	N
0.73	38.2	1.73	24.77	12.48	64.7	3045.4	516.6000	N

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude

-77 Degrees 19 Minutes 51.00 Decimal Seconds

8.2 Maximum Longitude

-69 Degrees 56 Minutes 27.60 Decimal Seconds

8.3 Minimum Latitude

36 Degrees 51 Minutes 51.00 Decimal Seconds

8.4 Maximum Latitude

42 Degrees 05 Minutes 15.49 Decimal Seconds

8.5 Name of area or region

Delaware and Maryland Coastal Bays

Stations were located in coastal bays along the East Coast of the United States in the States of Delaware and Maryland. Four major subsystems included Rehoboth Bay, Indian River Bay, Assawoman Bay and Chincoteague Bay. Areas of interest included Indian River, St. Martin River, Trappe Creek and artificial lagoons.

9. QUALITY CONTROL/QUALITY ASSURANCE

9.1 Data Quality Objectives

Measurement quality objectives are outlined for precision and accuracy are outlined below:

	Maximum Allowable Accuracy Goal	Precision Goal	Completion Goal
Chlorophyll a	20 %	20%	90%
Turbidity (NTU)	+/-20 units	10%	90%
Ammonia nitrogen	30 %	30%	90%
Total nitrogen	30 %	30%	90%
nitrate/nitrite nitrogen	30 %	30%	90%
Total phosphate	30 %	30%	90%
Orthophosphate	30 %	30%	90%
Dissolved organic carbon	30 %	30%	90%
Particulate carbon	30 %	30%	90%
Particulate nitrogen	30 %	30%	90%
Particulate phosphorus	30 %	30%	90%

9.2 Quality Assurance/Control Methods

9.2.1 Sample Collection Quality Control

At least once during the field season, QA evaluation of each field crew will be performed by either the QA officer or a designee to insure compliance with prescribed protocols. Field crews will be re-trained whenever discrepancies are noted.

9.2.2 Sample Processing Quality Control

Complete and detailed QA/QC procedures for field and laboratory measurements can be found in the EMAP-E Quality Assurance Project Plan (Heitmuller and Valente, 1992). QA sample procedures for chlorophyll, nitrogen and phosphorus are outlined below:

QA Sample Type	Frequency of Use	Data Generated for Measurement Quality Definition
Duplicates and analysis of standards	Each batch	Duplicate results and standard recovery

9.3 Unassessed Errors

NA

10. DATA ACCESS

10.1 Data Access Procedures

Data can be requested from a contact under Section 10.3.
Data can be downloaded from the WWW server.

10.2 Data Access Restrictions

Data can only be accessed from the WWW server.

10.3 Data Access Contact Persons

Dr. Frederick W. Kutz
U.S. EPA Region III
(410) 305-2742 (Tele)

10.4 Data Set Format

Data can be transmitted in a variety of formats derived from SAS data sets.

10.5 Information Concerning Anonymous FTP

Data cannot be accessed via ftp.

10.6 Information Concerning WWW

Data can be downloaded from the WWW server.

10.7 EMAP CD-ROM Containing the Data Set

Data are not available on CD-ROM

11. REFERENCES

American Public Health Association. 1981. Standard Methods for the Examination of Water and Wastewater. 15th ed.

Aspilla, I.H., Agemian and A.S.Y. Chau. 1976. A semi-automated method for the determination of inorganic, organic and total phosphate in sediments. *Analyst* 101:187-197.

Chaillou, J.C., S.B. Weisberg, F.W. Kutz, T.E. DeMoss, L. Mangiaracina, R. Magnien, R. Eskin, J. Maxted, K. Price and J.K. Summers. 1996. Assessment of the Ecological Condition of the Delaware and Maryland Coastal Bays. U.S. Environmental Protection Agency. Prepared by Versar, Inc., Columbia, MD.

D'Elia, C.F., P.A. Steudler, and N. Corwing. 1977. Determination of total nitrogen in aqueous samples using persulfate digestion. *Limnol. Oceanogr.* 22:760-764.

EPA Method 353.2

EPA Method 350.1

EPA Method 365.1

Holland, A.F., ed. 1990. Near Coastal Program Plan for 1990: Estuaries. EPA 600/4-900/033. Narragansett, RI: U.S. Environmental Protection Agency, NHEERL-AED, Office of Research and Development.

Leeman Labs, Inc. 1988. The automated and advanced Model 240X-A Elemental Analyzer.

Menzel, D.W. and R.F. Vaccaro. 1964. The measurement of dissolved organic and particulate carbon in seawater. *Limnol. Oceanogr.* 9:138-142.

Strobel, C. J., 1990. Environmental Monitoring and Assessment Program - Near Coastal Component: 1990 Demonstration Project, Field Operations Manual. U.S. EPA NHEERL-AED. Narragansett, RI. October 1990.

Weisberg, S.B., J.B. Frithsen, A.F. Holland, J.F. Paul, K.J. Scott, J.K. Summers, H.T. Wilson, R. Valente, D.G. Heimbuch, J. Gerritsen, S.C. Schimmel and R.W. Latimer, 1993. EMAP-Estuaries Virginian Province 1990 Demonstration Project Report. EPA 620/R-93/006. U.S. Environmental Protection Agency, NHEERL-AED, Narragansett, RI 02882-1197.

12. TABLE OF ACRONYMS

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